KENTUCKY UNDERGRADUATE RESEARCH SCHOLARS PROGRAM

"There isn't any solution to this problem of education other than to realize that the best teaching can be done only when there is a direct individual relationship between a student and a good teacher - a situation in which the student discusses the ideas, thinks about the things, and then talks about the things…. It's impossible to learn very much by simply sitting in a lecture, or by doing assigned homework problems."[1]

Richard Feynman
Nobel Laureate in Physics
California Institute of Technology

Today Kentucky stands at a crossroad. The Commonwealth can choose between investing in the kind of high-quality one-on-one undergraduate education described by Feynman and called for by others in the education community[2] or it can watch talented Kentucky students leave the state to pursue their educations elsewhere. The chances, of course, are considerable that those who leave the state will not return to live and work in Kentucky and thus will not use their skills and abilities to help ensure a prosperous and bright future for the Commonwealth. A recent Kentucky Council on Postsecondary Education report revealed the encouraging result that 95 percent of in-state graduates remained in Kentucky five years after graduation![3]

Kentucky can ill afford to lose talented students as the state already suffers from a significant deficit of college-educated residents. According to 2004 census data[4], only 21 percent of Kentucky's age 25 and older citizens have attained a bachelor's degree or higher, placing Kentucky at 47th among the 50 states. Only Mississippi, Arkansas, and West Virginia rank lower. If one looks at the percent of those age 25 or older who hold science or engineering doctoral degrees among Kentucky and its eight nearest neighbor states (Arkansas, Illinois, Indiana, Missouri, Ohio, Tennessee, Virginia, and West Virginia), areas of knowledge critically linked to economic development, Kentucky ranks 7th of these nine states[5]. Again, only Arkansas and West Virginia rank lower.

Undergraduate Education – A Changing National Picture

For most Kentucky students, an undergraduate education means attending lectures, taking notes and participating in "highly-choreographed" laboratories. While one can argue that these are necessary, they are not, unfortunately, providing our students with the skills they will need to compete in today's globally-competitive marketplace. As revealed in the national study *Measuring Up 2004*, Kentucky undergraduates score below the national average on assessments of writing, critical thinking and problem solving skills. Further, not enough Kentuckians score well on examinations needed for admission to graduate school.[6]

Today, increasing numbers of undergraduates are being challenged to think critically and to develop their analytical and problem solving skills by addressing current and topical problems in their disciplines. Under the direction of their faculty, more students are engaging in research,

scholarly, and creative work that is being presented at regional, national and international conferences, and published in peer-reviewed professional journals. Well-established and highly-regarded institutionalized research programs that engage undergraduates in these important learning experiences are today found across a wide spectrum of academic institutions (Truman State University, University of North Carolina – Asheville, University of Michigan, California Institute of Technology, Massachusetts Institute of Technology, University of Delaware, and the entire University of Minnesota system, among others), along with many new, up-and-coming programs (Middle Tennessee State University, University of Wisconsin – Eau Claire, College of Charleston, Duquesne University, and others). If Kentucky undergraduates are to compete with students from these institutions, they must be provided with similar learning opportunities to ensure that they develop the critical thinking, analytical and intellectual skills that are essential if we are to ensure Kentucky's future prosperity.

Kentucky's *Public Agenda for Postsecondary and Adult Education* asks five important questions regarding education in the Commonwealth.[7] Of these, Questions 3, 4, and 5 are particularly important to higher education and can be addressed by the creation of a program that engages undergraduates in faculty-mentored research and scholarly projects. Question 3 encourages students to stay in school and seek advanced degrees. Question 4 asks whether Kentucky citizens are prepared for life and work. Question 5 asks whether or not Kentuckians can be even greater contributors to Kentucky's future economy and prosperity. Engagement in faculty-mentored research, scholarly and creative work can help Kentucky achieve its objectives as active involvement in research has been shown to (1) enhance college retention[8], (2) increase the number of students pursuing advanced degrees (including students from minority groups)[9], and (3) enhance student intellectual development[10].

Important First Steps

While the teaching and learning strategies of 50 years ago may have adequately served the needs of a manufacturing and agrarian economy, they do not adequately serve the needs of students who now have to compete in a global marketplace. Kentucky's universities and colleges have already begun to invest existing resources in programs that enable Kentucky undergraduates to engage in faculty-mentored research and scholarly work. A partial list of these programs and activities include the establishment of:

1. undergraduate research offices at Murray State University and the University of Kentucky to promote engagement of undergraduates in scholarly work across their campuses,
2. The Center for Integrative Natural Science and Mathematics, as part of Kentucky's Center of Excellence program, at Northern Kentucky University,
3. extensive undergraduate research fellowship program at Morehead State University,
4. summer research programs at the University of Louisville and the University of Kentucky,
5. a new Quality Enhancement Program called "Ideas to Action" at the University of Louisville to build student critical thinking skills,
6. student research conferences at Western Kentucky University and at Kentucky Community and Technical College System (KCTCS) to celebrate and recognize undergraduate research accomplishments on these two campuses, and
7. Posters-at-the-Capitol, an annual celebration of undergraduate research in Frankfort, participated in by all eight of Kentucky's public universities and KCTCS.

Additionally, faculty at all Kentucky institutions seek support on externally-funded research grants to enable undergraduates to become active participants and contributors on these awards.

While these important initiatives have had a significant impact on the students who have been involved (with many of these students electing to pursue advanced or professional degrees after engaging in research and scholarly work), more of these opportunities need to be afforded to our students. It is not a lack of talent or ability that is holding Kentucky's students back; it is the lack of opportunity that is keeping our students from achieving their full potential.

The Kentucky Undergraduate Research Scholars (KURS) Program

We are proposing the creation of the Kentucky Undergraduate Research Scholars (KURS) program, a multi-institution, collaborative fellowship initiative to provide more Kentucky undergraduates with the opportunity to engage in faculty-mentored research, scholarly and creative work as do their peers at institutions across the nation.

Program

The KURS program will select and appoint 120 Kentucky Undergraduate Research Fellows annually for participation in the program. To be eligible to become a KURS Fellow, a student must be enrolled as a full-time undergraduate at one of Kentucky's eight public universities or in the Kentucky Community and Technical College System (KCTCS). Two competitions – one in early fall and one in early spring - will be hosted annually to identify KURS Fellows. Fellow awards will be distributed equally among the participating institutions, with each campus and the KCTCS system receiving about 13 awards annually.

Modeled after the highly-successful program in Minnesota[11], KURS will use a decentralized student selection process. Each campus' chief academic office will appoint a coordinator and a local committee who will oversee student selection and local KURS activities. While open to all disciplinary areas, projects that align with the state's Public Agenda will be encouraged (e.g. STEM, public health, and economic competitiveness), with advertising materials identifying Public Agenda emphasis areas. Selection of projects will be based upon 1) quality of the proposed research or scholarly work, 2) educational benefit to the student, 3) likelihood of success (including appropriateness of project timeline and budget and likelihood of developing outcomes that are publishable and about to be presented), and 4) level of faculty mentor involvement in project. Fellows will be encouraged to present and publish their work in local, regional and national venues.

Program Evaluation

Upon completion of the project, KURS Fellows will be required to submit final reports on their projects and complete an evaluation of the program (the last stipend check will be held until these materials have been submitted). Faculty sponsors will also be requested to complete an evaluation (mentor stipends will also be held until the evaluation is submitted). Additionally, the students and faculty will be asked to submit a list of all presentations, publications, and awards that result from the project. Finally, the Coordinating Office will track fellows for a period of three years after completion of the project to determine the impact of the fellowship on the participants' careers. Program outcomes will be reported to the Council on Postsecondary Education.

Coordinating Office

Murray State University's Undergraduate Research and Scholarly Activity office will coordinate the KURS program among the eight public universities and KCTCS. This office, established in 2001 to coordinate Murray State's undergraduate research efforts, will develop a KURS web page, distribute advertising materials to the nine campus coordinators, collect applications electronically, keep campuses updated as to the number of applications received, distribute applications to the campus coordinator after each deadline, collect the names of the successful applicants from the campus coordinators, communicate with student applicants and mentors, notify recipient's college and department, distribute KURS funds to the department of the faculty mentor (student and mentor stipend support and supplies and equipment funds will be awarded to the mentor's department for allocation), notify KY House and Senate members of student awards in their districts, be a repository for all student final reports, conduct the evaluation, provide follow-up, and communicate program outcomes to the Council on Postsecondary Education annually.

Budget

The budget for the program will include funds for 120 undergraduate projects, including student stipend support ($3200), funds for supplies and equipment ($500), and support for faculty ($500). Funds to enable 40 competitively-selected students and their mentors to travel to either the National Conference on Undergraduate Research or to a professional society meeting to present their research results and to cover administrative costs have also been included. Students will also be encouraged to participate in Kentucky's *Posters-at-the-Capitol* event in Frankfort.

Programmatic Costs	
Student Stipend (120 projects @ $3200/student*)	$384,000
Supplies and Equipment (120 projects @ $500)	60,000
Mentor Support (120 mentors @ $500**)	60,000
Travel***	
Kentucky Undergraduate Research Scholars (40 @ $600)	24,000
Faculty Mentors (40 @ $600)	24,000
Administrative Costs	
Individual Campus Costs (9 @ $4,000)	36,000
Personnel	
KURS Director (URSA Director Overload)	12,000
KURS Coordinator (salary and benefits)	50,000
Tracking Program	5,000
TOTAL	$655,000

* The stipend is calculated at $8 per hour for 400 hours. Projects started at the beginning of the fall term will, it is anticipated, require work over the entire academic year. Projects started in the spring term will involve spring term and summer work.

** Funds will be provided to the mentor to be used in accordance with university policy as a stipend, for travel or for the purchase of supplies.

*** Travel awards will be competitively selected. The top 40 projects will be funded for trips to the National Conference on Undergraduate Research or to a professional society conference.

References

[1] Richard Feynman, The Feynman Lectures on Physics, Addison-Wesley, Reading, MA, 1963, p.5.

[2] *Greater Expectations: A New Vision for Learning as a Nation Goes to College*, Association of American Colleges and Universities, National Panel Report (2002) (www.greaterexpectations.org); *Reinventing Undergraduate Education: A Blueprint for American's Research Universities*, Boyer Commission on Educating Undergraduates in the Research University, Carnegie Foundation for the Advancement Teaching (1995); *From Teaching to Learning: A New Paradigm for Undergraduate Education*, Robert Barr and John Tagg, Change (1995); *What Matters in College: Four Critical Years Revisited*, A. W. Astin, San Francisco, Jossey-Bass, (1993).

[3] *Brain Gain: Retaining Kentucky Graduates*, Kentucky Council on Postsecondary Education, Special Report 07.1, 2007.

[4] *Education Attainment in the United States: 2004*, Table 13. U.S. Census Bureau. (http://www.census.gov/population/www/socdemo/education/cps2004.html)

[5] *Stats Indiana*, U.S. Census Bureau (http://www.stats.indiana.edu/sip/edu/edu1_21.html)

[6] *Measuring Up 2004: The National Report Card on Higher Education*, The National Center for Public Policy and Higher Education, 2004. (http://www.highereducation.org)

[7] *Five Questions – One Mission, Better Lives for Kentucky's People*, A Public Agenda for Postsecondary and Adult Education, 2005-2010, Council on Postsecondary Education, July 18, (2005) (http://cpe.ky.gov/publicagenda).

[8] *Undergraduate Student-Faculty Research Partnerships Affect Student Retention*, B. A. Nagda, S.R. Gregerman, J. Jonides, W. von Hippel, and J.S. Lerner, Review of Higher Education 22, 55-72 (1998)

[9] *The Relationship of Undergraduate Research Participation to Graduate and Professional Education Pursuit: An Empirical Study*, R.S. Hathaway, Biren A. Nagda, and S.R. Gregerman, Journal of College Student Development, Vol. 43, No. 5 (2002); *Alumni Perceptions Used to Assess Undergraduate Research Experience*, K.W. Bauer, J.S. Bennett, The Journal of Higher Education, 74: 210-230 (2003).

[10] *Measuring the Impact of the Undergraduate Research Experience on Student Intellectual Development*, W.H. Rauckhorst, J.A. Czaja, and M.B. Magolda, pKal Conference, Snowbird, Utah. (2001).

[11] University of Minnesota, Undergraduate Research Opportunities Program (UROP) http://www.urop.umn.edu/